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The effect of sugar and hypochlorite on the vaselife of cut roses and carnations

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1 SUMMARY

Rosa Indica is an important cut flower in Kenya earning a lot of money in terms of export earnings. Vaselife reflects its post harvest longevity. Different methods are used to prolong the vaselife of Roses and Carnations. The main objectives of the present studies which were conducted at Maseno University in the year 2008 were to find the effects of Sucrose and hypochlorite on the vase life of Roses and carnations The two chemicals were used forming treatments which were laid out in a completely randomized design. The source of the flowers was the Finlay Company in Kericho, Kenya. Sucrose was added in the vase solution to act as a source of carbohydrates to assist the flower to absorb water and prevent transpiration and maintain turgidity. The biocide was used to kill bacteria in the vase solution. Flowers were obtained for the experiment at the bud stage. Data was collected on the number of days to flower opening, petal wilting, leaf yellowing, stem bending and vaselife. The data was analyzed using SAS (Statically Analysis System) into analysis of variance and mean separation was carried out using
the L.S.D method .Both the chemicals used increased the vaselife of the two cut flowers in this study and reduced the quality by reducing parameters such as flower yellowing and stem bending. It is concluded that they should be used in the vase solutions of these flowers.

2 INTRODUCTION

Cut roses and carnations are important I Kenya for foreign exchange earnings of about $ 250,000,000 per annum and employ 50,000 – 70,000 people directly and more than 1.5 million people indirectly. Cut flowers in general have a short post harvest life. The vase life of cut flowers can be increased by use of environmental conditions (Larson, 1992), sucrose solution, (Liao et al 2000), sodium hypochlorite and silver thiosulphate (Gollnow and Nell, 2002). Agronomic practices can also increase the vase life. (Larson, 1992) To avoid wilting of flowers, they are dipped in water. However a risk of air embolism occurs when cutting the flowers during harvesting. Air is usually absorbed by the stem and this bubble of air prevents water uptake by the flower. To save his problem the stem is re-cut in water mixed with citric acid at 350 ppm (Anon 2005) Sugar is usually added in the water to provide a substrate for respiration and maintain osmotic potential in the cells for water uptake. Bacteria grow quickly in any liquid having sugars. Bacteria start growing at the base of the cut stems as soon as the flowers are placed in water. This prevents water and nutrients uptake by the stem. To reduce bacterial growth antibacterial substance or biocides are used. Hydroxyquinine, salts, Aluminium sulphate and other slow release compounds are commonly

used. (Bult, 2007, Collnow and Neil, 2002). This study is aimed at extending the vase life of cut roses and carnation using sugar and biocide. The objectives of the study were: 1. Investigate the effect of sucrose on Roses. 2 Investigating the effect of sodium hypochlorite on Roses.

3 MATERIALS AND METHODS

The studies were conducted in the laboratories at Maseno University, Kenya in the year 2008. The flowers were obtained from the Finlay Flower Company stationed at Kericho Town in Kenya. Roses were harvested at the bud stage while the carnations had already opened but were uniform. Two litters of distilled water was measured by a volumetric flask and poured in all the 15 vases to be used in the study. The treatments were: Treatment 1: No sugar or biocide. Only distilled water. Treatment 2: 360 g of sugar dissolved in the 2 liters of vase solution No Biocide Treatment 3: 240 g sugar dissolved in the 2 litres of vase solution, 20 ml of biocide was added to the vase solution Treatment 4: 120g of sugar dissolved in the vase solution, 40ml of the biocide added to the vase solution. Treatment 5: No sugar used. 60ml of biocide added to the vase solution. The treatments were replicated three times. He flowers were then re-cut before being dipped in the vases so as to prevent air embolism which would prevent water uptake by the flower stem. The experimental design was completely randomized. The flowers were then observed daily for any signs of deterioration including: flower opening, withering , change of petal color, yellowing of leaves, stem bending and the total number of days that the flowers stayed in vase before being discarded. Data was recorded on daily basis and was subjected to analysis of variance and mean separation by the according to statistical analysis (SAS) procedures.

4 RESULTS AND DISCUSSION

Treatment 3, (240 sugar + 20 biocide had the highest vase life for roses (Table 1).

This was due to its optimum sucrose content and biocide in it needed to reduce bacterial growth. Treatment 5(O sugar and 60 ml of biocide) had the shortest vase life. Butt, (2007) reported that the shelf life of cut flowers is improved by the addition of sugar to vase solution. This supports the findings of our study. However, sugar enhances growth of fungi and bacteria which can be reduced by adding the biocide to the vase solutions. For this reason flower vases should be cleaned regularly and the solution treated with biocides. When a flower stem is cut, the cells at the cut end may attempt to close (suberize) the wound. This response might help prevent microorganisms from growing but in cut flowers such plugs from microorganisms will restrict water flow and shorten the vaselife (Chandron, 2006). Treatments 5 had short vase life because it had only biocide but no sugar as compared to Treatment 3 (Table 1, 2).These results agree with Himatsu, 2000. Sugars are substrate for respiration. This applies to cut flowers since they lack food, hormones and water supply after detachment from the parent plant and they depend solely on stored food at the time of harvest and exogenous application of sugars. Exogenous application of sucrose supplies the flower with the much needed substrates for respiration and prolongs the vase life (Donoghue et al, 2002, Dorn 1999, Kumor, 2003). This sugar with biocides has become an important commercial preservative for several cut flowers. With respect to flower opening, T1, T2 and T3(Table 1 and 2) were not different as compared to T4 and T5, T1 flowers opened up by the use of its inherent stored sugars in the plant tissues. T2 and T3 showed faster opening because they had inherent sugar and exogenous supply of sugar. T4 and T5 were the last to open up because they had high levels of biocides which could have slowed down water and sugar uptake by plant tissues. The treatments affected flower withering which is characterized by loss of turgidity of the flowers. All treatments were significantly different. T3 delayed the most in showing flower withering followed by T4, T2, T1 and lastly T5. T 3 had the correct amount of sugar required to take up water from the vase solution. T1 and T5 has no sugar and hence could not create an osmotic potential required by cells to draw up water therefore showing faster withering signs than T3.(Table 1 and 2) Leaf yellowing was recorded as the number of days to the first sign of yellowing of the leaves observed as yellow sports. It minimized their aesthetic value. T1 and T2 were not different and they had faster yellowing. T1 had no sugar for

pigment manufacture. T2 had higher sugar content. T3, T4 and T5 were different from T1 and T2. Leaf yellowing was delayed most in T3 which had enough sugar for structural support and biocides to reduce microbial growth. With respect to stem bending T1 and T4 were no significantly different. They had very straight stems. T5 was similar to T2 while T3 and T4 were slightly straight T3, T4, T5 had less sugar them, possibly, reducing their turgidity hence stem (Table 1 and 2)

5 CONCLUSION

The vase life of the cut flowers in this study was increased by the sugar in them due to increased water uptake. The biocide increased the shelf life of the cut flowers where it was added to the vase solution

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Table 1: Roses

TREATMENTS	Shelf life	Flower opening	Leaf yellowing	Flower withering	Stem bending
T1	15.7d	1.0c	9.7b	4.3e	7.7d
T2	20.3b	2.0c	9.3b	7.7c	7.0d
T3	22.7a	2.3c	12.0a	10.3a	13.7a
T4	18.7c	4.3b	8.7c	9.0b	12.7b
T5	14.3e	9.6a	6.7d	5.7d	9.3c
L.S.D	1.0	1.4	0.9	0.9	0.9
CV	3.1	18.9	5.6	6.5	5.1

Means followed by the same letter in the same column are not significantly (P≤0.001) difference

Table 2: Carnations

TREATMENTS	Shelf life	Flower discoloration	Stem bending
T1	15.3d	9.7c	14.7a
T2	18.3 c	17.7b	11.0b
T3	21.7a	20.0a	12.3c
T4	20.0b	16.7b	14.7a
T5	14.3e	8.0d	13.7b
L.S.D	0.9	1.2	0.88
CV	2.8	4.4	3.5

Means followed by the same letter in the same column are not significantly